Exhibit 6-5
Alternative C-R Functions for Long-Term $PM_{2.5}$-Related Premature Mortality

Study	Mortality Category	Age	Pollutant	Metric
Pope et al. (2002)	All-cause	30+	$PM_{2.5}$	Annual Mean
Krewski et al. (2000) reanalysis of Pope et al. (1995)	All-cause	30+	$PM_{2.5}$	Annual Median
Krewski et al. (2000) reanalysis of Pope et al. (1995). Random effects, independent cities	All-cause	30+	$PM_{2.5}$	Annual Median
Krewski et al. (2000) reanalysis of Pope et al. (1995). Random effects, regional adjustment	All-cause	30+	$PM_{2.5}$	Annual Median
Pope et al. (2002)	All-cause	30+	$PM_{2.5}$	Annual Median
Krewski et al. (2000) reanalysis of Dockery et al. (1993)	All-cause	25+	$PM_{2.5}$	Annual Mean
Dockery et al. (1993)	All-cause	25+	$PM_{2.5}$	Annual Mean
Pope et al. (2002)	Cardiopulmonary	30+	$PM_{2.5}$	Annual Mean
Pope et al. (2002)	Lung Cancer	30+	$PM_{2.5}$	Annual Mean

Accounting for Potential Health Effect Thresholds

When conducting clinical (chamber) and epidemiological studies, C-R functions may be estimated with or without explicit thresholds. Air pollution levels below the threshold are assumed to have no associated adverse health effects. When a threshold is not assumed, as is often the case in epidemiological studies, any exposure level is assumed to pose a non-zero risk of response to at least one segment of the population.

The possible existence of an effect threshold is a very important scientific question and issue for policy analyses such as this one. The SAB Council has advised EPA that there is currently no scientific basis for selecting a threshold of 15 : g/m3 or any other specific threshold for the PM-related health effects considered in typical benefits analyses (EPA-SAB-Council-ADV-99-012, 1999). This is supported by the recent literature on health effects of PM exposure (Daniels et al., 2000; Pope, 2000; Rossi et al., 1999; Schwartz, 2000) which finds in most cases no evidence of a non-linear concentration-response relationship and certainly does not find a distinct threshold for health effects. The most recent draft of the EPA Air Quality Criteria for Particulate Matter (U.S. EPA, 2002) reports only one study, analyzing data from Phoenix, AZ, that reported even limited evidence suggestive of a possible threshold for PM2.5 (Smith et al., 2000).

Recent cohort analyses by the Health Effects Institute (Krewski et al., 2000) and Pope et al. (2002) provide additional evidence of a quasi-linear concentration-response relationship between long-term exposures to PM2.5 and mortality. The Executive Summary of the Reanalysis concludes: "They found some indications of both linear and nonlinear relationships, depending upon the analytic technique used, suggesting that the issue of concentration-response relationships deserves additional analysis. The Pope et al. (2002) analysis, which represented an extension to the Krewski et al. analysis, found that the concentration-response relationships relating PM2.5 and mortality "were not significantly different from linear associations."

[continue on 6-22 – June 26 revised]